Consequences of cost barriers to prescriptions: cohort study in Aotearoa New Zealand

Mona Jeffreys, Megan Pledger, Fiona McKenzie, Lis Ellison-Loschmann, Maite Irurzun Lopez, Jacqueline Cumming

ABSTRACT

AIMS: A NZ$5 co-payment prescription charge was removed in July 2023 but may be reinstated. Here we quantify the health impact and cost of not being able to afford this charge.

METHODS: We linked New Zealand Health Surveys (2013/2014–2018/2019) to hospitalisation data using data available in Integrated Data Infrastructure (IDI). Cox proportional-hazards models compared time to hospitalisation between those who had faced a cost barrier to collecting a prescription and those who had not.

RESULTS: Of the 81,626 total survey respondents, 72,243 were available for analysis in IDI. A further 516 were excluded to give an analysis dataset of 71,502. Of these, 5,889 (8.2%) reported not collecting a prescription due to cost in the previous year. Among people who faced a cost barrier, 60.0% (95% confidence interval [CI] 58.7–61.2%) were admitted to hospital during the study period, compared to 43.9% (95% CI 43.6–44.3%) of those who did not. Having adjusted for socio-demographic variables, people who faced a cost barrier were 34% (hazard ratio 1.34; 95% CI 1.29–1.39) more likely to be admitted to hospital than those who did not. Annual avoidable hospitalisation costs—were prescription co-payments to remain free—are estimated at $32.4 million per year based on the assumption of a causal relationship between unmet need for prescription medicines and subsequent hospitalisation.

CONCLUSIONS: The revenue to the health system from co-payments may be offset by the costs associated with avoidable hospitalisations.

KEY MESSAGES:

- Facing a cost barrier to collecting a prescription is associated with a 34% higher rate of hospitalisations.
- Hospitalisations that are potentially avoidable are estimated to cost about $32.4 million per year.
- Reinstating prescription co-payments may have detrimental effects on health, health equity and health system costs.

Universal health coverage (UHC) is defined by the World Health Organization as all people having access to quality health services as needed, without financial hardship.[1] Although UHC is often described in terms of accessing health professionals, being able to afford prescribed medications is an essential component of care, as stated explicitly in Sustainable Development Goal 3.8.[2]

In Aotearoa New Zealand (Aotearoa), the Pharmaceutical Management Agency (Pharmac) subsidises many medications, and until recently (1 July 2023) people aged over 14 years paid a NZ$5 charge per item dispensed from a community pharmacy. There were no exceptions based on income or (in)ability to pay, other than an annual household cap of $100. The co-payment presented a financial barrier to healthcare; the proportion of adults who reported being unable to collect a prescription due to cost in 2022/2023 was 4%, but there are significantly higher rates for some population groups (see below).[3]

The cost of outpatient medicines is a source of financial hardship in many European countries, particularly among the poorest people.[4] International evidence suggests that user co-payments for medications undermine health equity.[5] In Aotearoa, Māori are over twice as likely to face a cost barrier to collecting a prescription than non-Māori.[3] These inequities are more evident among poorer people; 26% of Māori in low-income households reported not being able to pay a prescription charge at least once in the previous year, compared to 9% of non-Māori.[6] A study using the Survey of Family, Income and Employment found that people who could not afford to collect a prescription had poorer self-reported physical and mental health,[7] and subsequent declines in health.[8]

The few studies that have directly investigated the effect of co-payments on health outcomes have found that small changes in co-payments

can directly affect health. A study in Italy found that abolishing a €1.50 co-payment improved patient anti-hypertensive compliance; this was in turn associated with a reduced risk of hospitalisation and mortality.[9] A study comparing adherence to asthma medications in England (where patients pay charges) with Scotland (where no charges are payable) found that co-payments were associated with twice the risk of severe asthma exacerbations.[10]

In summary, the prescription co-payment was dropped in July 2023, with plans by the new Government to reinstate this, although it will remain free for some population groups. The objective of this study was to establish whether facing a cost barrier to obtaining a prescription medicine in Aotearoa was associated with time to an inpatient hospitalisation, so as to inform policy regarding the re-instating of prescription charges.

Methods

The study cohort comprised respondents to the New Zealand Health Survey (NZHS) linked to hospitalisation and mortality databases using a Ministry of Health unique identifier. These databases were linked and analysed within the Integrated Data Infrastructure (IDI),[11] and were accessed in the secure environment of the Datalab at Statistics New Zealand. All output is checked by Statistics New Zealand specialists to make sure it has been suitably confidentialised before being released.

The NZHS is an annual, cross-sectional, face-to-face national survey that samples people aged 15+ from across Aotearoa. Respondents were included in the IDI if they agreed that their data could be used for further research and they could be matched to a National Health Index number based on their name, date of birth and address. On average, 400 respondents per survey requested that their responses not be linked and 1,105 respondents per survey could not be matched (in email, Ministry of Health, 2023). The IDI contains data from surveys that were run between 2011/2012 and 2018/2019, but the data analysed for this report are from 2013/2014 to 2018/2019 to match the constraints of the hospitalisation database.

From July 2013, the hospitalisation database contains data on all inpatient discharges resulting from any treatment of over 3 hours from public hospitals in New Zealand, including events that occur in the emergency department or start as outpatient appointments, and it records information on the start and end dates of the hospital stay. At the time of analysis, the database included hospital events up until 30 June 2021. The mortality dataset contains records of all deaths, and at the time of analysis this was complete to the end of 2018.

The main exposure variable was a self-report of facing a barrier to obtaining a prescription due to cost. Respondents to the NZHS were asked if during the previous year they had been given a prescription but did not collect one or more items because of cost. Respondents were classified as "unmet need" or "no unmet need" depending on whether they answered "yes" or "no" to this question. Forty-five people who answered "don't know" or refused to answer were analysed with the "no unmet need" group. Outcome data were: whether or not a hospitalisation occurred during the study period; a count of the number of hospitalisations during the study period; length of (first) hospital stay; and the time in days from the start of the study period to the first hospitalisation for those hospitalised.

Potential confounding variables included were **gender** (male or female); **age group** (10-year age bands from 15–24 to 75+ years); **self-reported ethnicity**,[12] prioritised into four mutually exclusive groups (Māori, Pacific peoples, Asian and European New Zealanders/Others); **area-level deprivation** (New Zealand Index of Deprivation [NZDep]. For surveys in 2013/2014 and 2014/2015 we used NZDep06, and for the later surveys NZDep13); **self-reported health**, measured on a five-point scale from excellent to very poor; 87 respondents (0.1%) who did not answer this question were assigned to the most commonly reported category, "very good"; **education**, based on highest completed qualification—missing data for 762 (1.1%) respondents were completed based on answers from a related question on highest secondary school qualification, or otherwise analysed in the largest category, post-secondary education; **household income**, reported in 16 categories in early surveys and eight in the later survey, with the latter used here. There was a large amount (n=12,270, 17%) of missing data in this question. Respondents who did not report household income, but did report personal income, had their household income imputed. This was done by filling the missing category with the most commonly reported household income category for each category of personal income. Those with no household or personal income reported (n=6,477, 9%) were analysed in a separate category.

Statistical analysis

Statistics New Zealand require that the data output is confidentialised. For the results presented here this means that: counts are rounded to the nearest multiple of 3 with probability 2/3 or the next closest with probability 1/3 (counts are checked so the rounding is consistent across outputs); and percentages and means are calculated using the randomly rounded base 3 counts. These methods were used to produce statistics on the demographic and health profile of the respondents and their hospitalisation characteristics. Given the large size of the cohort, focussing on statistical significance can be misleading; focussing on the magnitude of the differences is more important. We define conventional levels of statistical significance as $p<0.05$.

Kaplan–Meier survival curves that graphically represent the number of people who have not been admitted to hospital against follow-up time were inspected visually to assess potential violations of the proportional-hazards assumption. The time to hospitalisation was modelled using Cox proportional-hazards regression. Follow-up started at the date of the end of the survey a respondent was in and lasted until either the respondent was hospitalised, was known to have died or 30 June 2021, whichever came first. Mortality data are not available after 1 January 2019, which led to some respondents being censored at the end of the study period rather than at their unknown date of death. There were 156 recorded deaths without a hospitalisation between the start of the study period and 31 December 2018. From observing when deaths fell, it was estimated that 147 deaths without a hospitalisation (0.2%) would have occurred between 1 January 2019 and 30 June 2021.

Results

In total there were 72,243 respondents available for analysis in the IDI dataset across the six surveys. Some respondents took part in more than one survey; for these people, one observation was chosen at random to be kept (516, 0.7%, observations deleted). A further 225 people died before the study period started (0.3% deleted). Thus, 71,502 respondents were included in the analysis, ranging from 10,932 in the 2014/2015 survey (out of 13,497 respondents in the total survey, 81%) to 12,579 in the 2018/2019 survey (out of 13,572, 93%). Of these, 5,889 (8.2%) reported not being able to collect a prescription due to cost in the previous year. The average follow-up time for those with unmet need was 730 days and those with met need was 1,095 days.

The demographic and health profile of the two groups is shown in Table 1. Those who faced a cost barrier were more likely to be female and be younger. Māori and Pacific peoples were more likely to face these barriers than Asian or NZ European/Other ethnicities. Those in the unmet need group were more likely than those in the no unmet need group to live in the most deprived quintile of NZDep and report low incomes and lower education levels. Respondents in the unmet need group were more likely to be in the lowest two categories of self-rated health than the no unmet need group (33% vs 12%). They were more likely to have been told by a doctor that they have a chronic illnesses, with the greatest differences evident for depression, asthma, an anxiety disorder and diabetes.

Table 2 shows hospitalisation characteristics according to unmet prescription need. Overall, 60% of people who faced a cost barrier to obtaining a prescription had a hospitalisation during the study period compared to 44% of the no unmet need group. The same pattern was seen for both males and females, all age groups except for the oldest category (75+, $p=0.29$), all ethnic groups, all deprivation, education and income groups and all self-rated health groups, other than among those who reported very poor health, who had similar levels of hospitalisations (69% vs 67%, $p=0.38$).

Among those who had a hospitalisation during the study period, those in the unmet need group had an average of 3.8 hospitalisations compared to 3.1 in the no unmet need group. Across all socio-demographic categories, the unmet need group had more hospitalisations than the no unmet need group. An exception to this was among Asian peoples, where the difference did not meet conventional levels of statistical significance ($p=0.15$), and among people living in the most deprived areas or with the highest education levels, where the difference was small in magnitude. Although the unmet need group had more hospitalisations than the no unmet need group across all levels of self-rated health, the only group that reached conventional levels of statistical significance ($p<0.05$) was those with good health.

The mean length of the first hospital stay during the study period was 2.7 days for the unmet need group compared to 3.2 days for the no unmet need group. When stratified by socio-demographic categories, in most groups the stay was shorter for

Table 1: Demographic and health profile of 71,502 people in Aotearoa, according to unmet need in paying for prescriptions.

	Unmet need for prescriptions due to cost			
	Unmet need		No unmet need	
	N=5,889		N=65,613	
	%	95% CI	%	95% CI
Sex				
Female	71.5	(70.3–72.6)	56.0	(55.6–56.4)
Male	28.5	(27.4–29.7)	44.0	(43.6–44.4)
Age group				
15–24	12.3	(11.4–13.1)	11.1	(10.8–11.3)
25–34	22.1	(21.0–23.1)	15.1	(14.9–15.4)
35–44	19.5	(18.4–20.5)	16.2	(15.9–16.5)
45–54	19.7	(18.6–20.7)	15.8	(15.6–16.1)
55–64	15.6	(14.7–16.6)	16.2	(15.9–16.5)
65–74	7.5	(6.9–8.2)	14.4	(14.1–14.6)
75+	3.4	(2.9–3.8)	11.1	(10.9–11.4)
Prioritised ethnicity				
Māori	39.1	(37.9–40.4)	19.0	(18.7–19.3)
Pacific people	11.9	(11.1–12.7)	4.6	(4.5–4.8)
Asian	4.5	(4.0–5.0)	8.4	(8.2–8.6)
NZ European/Other	44.5	(43.2–45.7)	67.9	(67.6–68.3)
NZDep quintiles				
1 (least deprived)	5.0	(4.4–5.5)	14.6	(14.3–14.9)
2	8.8	(8.1–9.5)	17.5	(17.2–17.8)
3	15.2	(14.3–16.1)	20.3	(20.0–20.6)
4	22.3	(21.2–23.4)	22.8	(22.5–23.1)
5 (most deprived)	48.7	(47.4–50.0)	24.8	(24.5–25.1)
Highest educational qualification				
None	37.0	(35.8–38.2)	29.9	(29.5–30.2)
Secondary	20.5	(19.4–21.5)	14.7	(14.4–15.0)
Post-secondary	32.5	(31.3–33.7)	34.2	(33.8–34.6)

Table 1 (continued): Demographic and health profile of 71,502 people in Aotearoa, according to unmet need in paying for prescriptions.

Undergraduate	6.3	(5.7–6.9)	11.7	(11.5–12.0)
Postgraduate	3.7	(3.2–4.2)	9.5	(9.3–9.7)
Household income (NZ$)				
Loss or up to 20,000	24.6	(23.5–25.7)	9.3	(9.1–9.5)
20,001–30,000	17.1	(16.1–18.0)	11.5	(11.3–11.8)
30,001–50,000	19.0	(18.0–20.0)	16.3	(16.1–16.6)
50,001–70,000	12.8	(12.0–13.7)	15.4	(15.1–15.6)
70,001–100,000	7.7	(7.1–8.4)	14.6	(14.3–14.9)
100,001+	6.6	(6.0–7.3)	24.1	(23.8–24.4)
Missing	12.1	(11.3–13.0)	8.8	(8.6–9.0)
Self-rated health				
Excellent	5.8	(5.2–6.4)	13.9	(13.6–14.1)
Very good	22.3	(21.2–23.3)	40.5	(40.1–40.9)
Good	38.9	(37.6–40.1)	33.6	(33.2–34.0)
Poor	22.4	(21.3–23.5)	9.8	(9.5–10.0)
Very poor	10.6	(9.9–11.4)	2.3	(2.1–2.4)
Have you been told by a doctor that you have				
had a heart attack	5.2	(4.6–5.8)	4.1	(4.0–4.3)
angina	6.4	(5.8–7.0)	3.9	(3.8–4.1)
heart failure	4.4	(3.9–4.9)	2.4	(2.3–2.6)
other heart disease	10.7	(10.0–11.5)	8.5	(8.3–8.7)
had a stroke[a]	3.1	(2.6–3.5)	2.1	(2.0–2.2)
diabetes[b]	12.2	(11.3–13.0)	6.9	(6.7–7.1)
asthma	35.9	(34.6–37.1)	19.7	(19.4–20.0)
arthritis[c]	23.9	(22.9–25.0)	20.9	(20.5–21.2)
depression[d]	39.1	(37.8–40.3)	16.8	(16.5–17.1)
bipolar disorder[d]	4.3	(3.8–4.8)	1.1	(1.0–1.1)
anxiety disorder[d,e]	27.0	(25.9–28.1)	9.9	(9.7–10.2)

Note: a) does not include transient ischaemic attacks; b) does not include diabetes during pregnancy; c) includes gout, lupus and psoriatic arthritis d) conditions that lasted or expected to last more than 6 months; e) includes panic attacks, post-traumatic stress disorder, phobias and obsessive-compulsive disorders.

Table 2: Inpatient hospitalisations and length of hospital stay according to unmet need for paying for prescriptions, by demographic variables.

	Percentage hospitalised during the study period				Number of hospitalisations during the study period*				Length of first hospital stay during the study period*			
	Unmet need		No unmet need		Unmet need		No unmet need		Unmet need		No unmet need	
	n=5,889		n=65,613		n=3,531		n=28,827		n=3,531		n=28,827	
	%	95% CI	%	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
All	60.0	(58.7–61.2)	43.9	(43.6–44.3)	3.8	(3.6–4.0)	3.1	(3.1–3.1)	2.7	(2.6–2.8)	3.2	(3.0–3.4)
Sex												
Female	62.2	(60.8–63.7)	47.0	(46.5–47.5)	3.7	(3.5–3.9)	3.0	(3.0–3.1)	2.6	(2.4–2.7)	3.1	(2.9–3.3)
Male	54.5	(52.1–56.8)	40.0	(39.5–40.6)	4.1	(3.6–4.5)	3.2	(3.1–3.3)	3.1	(2.8–3.4)	3.4	(3.1–3.8)
Age group												
15–24	58.5	(54.9–62.1)	34.7	(33.6–35.8)	3.8	(3.3–4.3)	2.4	(2.3–2.5)	2.2	(2.0–2.3)	2.8	(2.2–3.3)
25–34	59.9	(57.2–62.6)	40.5	(39.5–41.4)	3.4	(3.1–3.7)	2.5	(2.3–2.6)	2.3	(2.1–2.5)	2.5	(2.4–2.7)
35–44	54.7	(51.8–57.6)	31.3	(30.4–32.1)	3.2	(2.9–3.5)	2.3	(2.2–2.4)	2.8	(2.5–3.2)	2.7	(2.4–3.0)
45–54	57.1	(54.3–60.0)	35.2	(34.3–36.1)	3.6	(3.3–4.0)	2.7	(2.6–2.8)	2.7	(2.4–3.0)	2.7	(2.5–2.9)
55–64	60.6	(57.4–63.7)	43.1	(42.2–44.1)	4.5	(3.8–5.1)	3.0	(2.9–3.1)	2.9	(2.6–3.2)	2.9	(2.6–3.2)
65–74	75.2	(71.2–79.2)	56.5	(55.5–57.5)	4.5	(4.0–5.0)	3.6	(3.4–3.7)	3.4	(2.8–4.0)	3.1	(3.0–3.3)
75+	76.9	(71.0–82.8)	73.5	(72.5–74.5)	5.2	(4.3–6.2)	4.3	(4.2–4.4)	3.9	(3.3–4.5)	5.1	(4.0–6.1)
Prioritised ethnicity												
Māori	63.0	(61.0–65.0)	45.9	(45.0–46.7)	3.8	(3.6–4.1)	3.1	(3.0–3.2)	2.6	(2.4–2.8)	3.1	(2.8–3.5)
Pacific people	59.8	(56.2–63.5)	42.6	(40.8–44.3)	4.2	(3.4–5.0)	3.0	(2.8–3.2)	2.9	(2.6–3.2)	3.1	(2.8–3.4)
Asian	40.4	(34.6–46.3)	28.5	(27.3–29.6)	2.8	(2.2–3.4)	2.4	(2.2–2.5)	2.8	(2.1–3.5)	2.6	(2.4–2.8)

Table 2 (continued): Inpatient hospitalisations and length of hospital stay according to unmet need for paying for prescriptions, by demographic variables.

	Percentage hospitalised during the study period				Number of hospitalisations during the study period*				Length of first hospital stay during the study period*			
	Unmet need		No unmet need		Unmet need		No unmet need		Unmet need		No unmet need	
	n=5,889		n=65,613		n=3,531		n=28,827		n=3,531		n=28,827	
	%	95% CI	%	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
NZ European/ Other	59.3	(57.4–61.2)	45.4	(44.9–45.9)	3.8	(3.5–4.0)	3.2	(3.1–3.2)	2.8	(2.6–3.0)	3.3	(3.0–3.6)
NZDep quintiles												
1 (least deprived)	53.1	(47.4–58.8)	36.8	(35.8–37.8)	4.0	(3.2–4.7)	2.7	(2.6–2.8)	2.7	(2.2–3.1)	2.9	(2.7–3.0)
2	58.4	(54.1–62.6)	40.5	(39.6–41.4)	4.0	(3.4–4.5)	3.0	(2.9–3.1)	2.8	(2.4–3.1)	3.1	(2.6–3.6)
3	58.2	(55.0–61.5)	43.8	(43.0–44.7)	3.6	(3.2–4.1)	3.1	(3.0–3.2)	2.5	(2.2–2.8)	2.9	(2.7–3.1)
4	58.5	(55.9–61.2)	46.0	(45.2–46.8)	4.0	(3.6–4.3)	3.1	(3.0–3.2)	2.7	(2.4–3.0)	3.5	(2.8–4.1)
5 (most deprived)	62.2	(60.5–64.0)	48.7	(48.0–49.5)	3.8	(3.5–4.0)	3.4	(3.3–3.5)	2.8	(2.6–2.9)	3.5	(3.1–3.9)
Highest educational qualification												
None	66.4	(64.4–68.4)	53.4	(52.7–54.1)	4.2	(3.8–4.5)	3.6	(3.5–3.7)	2.7	(2.5–2.9)	3.7	(3.2–4.2)
Secondary	55.5	(52.7–58.3)	39.0	(38.0–39.9)	3.3	(3.0–3.6)	2.7	(2.6–2.8)	2.6	(2.3–3.0)	3.1	(2.7–3.5)
Post-secondary	59.9	(57.7–62.1)	44.3	(43.7–45.0)	3.9	(3.6–4.2)	3.0	(2.9–3.1)	2.8	(2.6–3.1)	3.1	(2.8–3.4)
Undergraduate	45.2	(40.1–50.2)	33.9	(32.9–35.0)	3.1	(2.4–3.7)	2.6	(2.4–2.7)	2.6	(2.1–3.1)	2.6	(2.5–2.8)
Postgraduate	46.6	(40.0–53.2)	32.8	(31.7–34.0)	2.8	(2.1–3.6)	2.6	(2.4–2.8)	2.7	(2.2–3.2)	2.5	(2.4–2.7)
Household income ($)												
Loss, 0–20,000	66.0	(63.6–68.5)	57.6	(56.3–58.8)	4.5	(4.0–4.9)	4.0	(3.8–4.2)	3.2	(2.9–3.5)	3.9	(3.4–4.4)

Table 2 (continued): Inpatient hospitalisations and length of hospital stay according to unmet need for paying for prescriptions, by demographic variables.

	Percentage hospitalised during the study period				Number of hospitalisations during the study period*				Length of first hospital stay during the study period*			
	Unmet need		No unmet need		Unmet need		No unmet need		Unmet need		No unmet need	
	n=5,889		n=65,613		n=3,531		n=28,827		n=3,531		n=28,827	
	%	95% CI	%	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
20,001–30,000	64.5	(61.5–67.4)	59.5	(58.4–60.6)	3.9	(3.5–4.3)	3.8	(3.7–3.9)	2.5	(2.3–2.7)	3.9	(3.2–4.6)
30,001–50,000	59.5	(56.6–62.4)	48.9	(47.9–49.8)	3.2	(2.9–3.4)	3.2	(3.1–3.3)	2.7	(2.4–3.0)	3.2	(2.9–3.5)
50,001–70,000	50.4	(46.8–54.0)	40.9	(39.9–41.8)	3.3	(2.9–3.6)	2.7	(2.6–2.8)	2.4	(2.2–2.7)	2.8	(2.2–3.4)
70,001–100,000	53.3	(48.7–57.9)	36.9	(35.9–37.8)	3.1	(2.6–3.7)	2.5	(2.4–2.6)	2.5	(2.1–2.9)	2.5	(2.4–2.7)
100,001+	46.9	(42.0–51.9)	31.7	(30.9–32.4)	3.1	(2.4–3.7)	2.3	(2.2–2.4)	2.0	(1.8–2.2)	2.6	(2.4–2.7)
Missing	63.9	(60.3–67.4)	50.8	(49.5–52.0)	4.4	(3.9–4.9)	3.4	(3.2–3.5)	2.8	(2.5–3.1)	4.1	(2.8–5.5)
Self-rated health												
Excellent	53.5	(48.2–58.8)	36.7	(35.7–37.7)	3.0	(2.5–3.4)	2.6	(2.5–2.7)	2.6	(2.2–3.0)	2.9	(2.6–3.2)
Very good	53.7	(51.0–56.4)	40.7	(40.1–41.3)	3.0	(2.8–3.3)	2.8	(2.7–2.8)	2.6	(2.3–2.8)	3.1	(2.8–3.4)
Good	60.2	(58.2–62.2)	46.1	(45.5–46.8)	3.8	(3.4–4.1)	3.2	(3.1–3.2)	2.7	(2.5–2.9)	3.1	(2.8–3.5)
Poor	63.0	(60.4–65.6)	54.4	(53.2–55.6)	3.9	(3.7–4.2)	4.0	(3.8–4.1)	2.8	(2.5–3.1)	4.0	(3.1–4.8)
Very poor	69.4	(65.8–73.0)	67.4	(65.0–69.8)	5.4	(4.7–6.0)	4.8	(4.4–5.3)	3.0	(2.6–3.3)	4.7	(3.4–6.1)

*For those people with at least one inpatient hospitalisation.

Table 3: Time to first inpatient hospitalisation according to unmet need for paying for prescriptions, by demographic variables, among 32,358 people who were hospitalised.

	Days till first inpatient hospitalisation*			
	Unmet need		No unmet need	
	n=3,531		n=28,827	
	Mean	95% CI	Mean	95% CI
All	582	(564–599)	650	(644–657)
Sex				
Female	576	(556–596)	643	(635–651)
Male	596	(561–630)	662	(652–672)
Age group				
15–24	579	(531–627)	743	(720–765)
25–34	567	(530–603)	650	(633–666)
35–44	611	(568–654)	693	(674–712)
45–54	617	(575–660)	729	(710–749)
55–64	579	(536–621)	702	(685–719)
65–74	534	(482–587)	624	(609–638)
75+	497	(413–580)	510	(498–523)
Prioritised ethnicity				
Māori	573	(546–601)	660	(645–675)
Pacific people	567	(517–617)	642	(611–672)
Asian	630	(524–737)	671	(644–698)
NZ European/ Other	590	(564–616)	647	(639–654)
NZDep quintiles				
1 (least deprived)	604	(529–680)	687	(669–706)
2	638	(576–700)	683	(667–700)
3	575	(530–620)	674	(659–688)
4	563	(526–599)	625	(612–637)
5 (most deprived)	580	(555–604)	620	(608–632)
Highest educational qualification				
None	613	(585–641)	666	(655–677)
Secondary	554	(515–592)	600	(583–616)
Post-secondary	552	(523–582)	648	(637–659)

Table 3 (continued): Time to first inpatient hospitalisation according to unmet need for paying for prescriptions, by demographic variables, among 32,358 people who were hospitalised.

Undergraduate	616	(536–697)	662	(641–683)
Postgraduate	594	(483–704)	663	(639, –686)
Household income				
Loss, 0–20,000	553	(520–587)	600	(582–618)
20,001–30,000	589	(549–629)	557	(543–572)
30,001–50,000	581	(543–620)	641	(626–656)
50,001–70,000	609	(556–662)	689	(671–706)
70,001–100,000	610	(543–676)	687	(669–706)
100,001+	584	(505–662)	691	(676–706)
Missing	589	(538–641)	703	(681–725)
Self-rated health				
Excellent	713	(632–795)	734	(714–753)
Very good	656	(615–696)	696	(685–706)
Good	593	(565–621)	633	(623–644)
Poor	538	(503–572)	544	(528–561)
Very poor	455	(412–499)	423	(396–450)

*For those people with at least one inpatient hospitalisation

the unmet need group compared to the no unmet need group, but in many instances the difference did not reach conventional levels of statistical significance.

During the study period, 32,358 people were hospitalised. Table 3 shows the time taken to the first hospitalisation. This was 582 days for the unmet need group and 650 days for the no unmet need group. For both males and females, the difference between groups was just over 2 months, with the unmet need group attending earlier. For all ethnicities other than among Asian peoples, the unmet need group were quicker to be hospitalised than the no unmet need groups. Similarly, across NZDep, household income and education groups, the unmet need group were quicker to be hospitalised than the no unmet need group, other than those in quintile 2 of NZDep and the second lowest income category. In the unmet need group, people with good health arrived at hospital 40 days earlier than the no unmet need group; no differences were seen for other categories of self-rated health.

In univariate analyses, people who reported unmet need had a 58% higher risk of hospitalisation during follow-up than those who reported no unmet need (hazard ratio [HR] 1.58, 95% confidence interval [CI] 1.52–1.63). Adjusting for socio-demographic variables and self-rated health did not explain this association, with the HR in the fully adjusted model being 1.34 (95% CI 1.29–1.39).

Based on visual inspection of Kaplan–Meier survival curves, the 25–34-year age group were more likely to be hospitalised earlier and less likely to be hospitalised later relative to other age groups. To see if the failure in the assumption of proportional hazards affected the HR for the unmet need compared to no unmet need group, the fully adjusted model was refitted with this age group removed. Doing so had no material impact

Table 4: Fully adjusted model of time to first hospitalisation.

	Hazard ratio	95% CI	P-value
Need groups			
Unmet need	1.34	(1.29–1.39)	<0.001
Met need	1		
Sex			
Female	1.19	(1.17–1.22)	<0.001
Male	1		
Age group			
15–24	1.08	(1.03–1.13)	0.002
25–34	1.37	(1.32–1.43)	<0.001
35–44	1		
45–54	1.09	(1.05–1.14)	<0.001
55–64	1.40	(1.34–1.46)	<0.001
65–74	2.08	(1.99–2.17)	<0.001
75+	3.27	(3.13–3.43)	<0.001
Prioritised ethnicity			
Māori	1.49	(1.41–1.57)	<0.001
Pacific people	1.43	(1.34–1.54)	<0.001
Asian	1		
NZ European/Other	1.42	(1.35–1.50)	<0.001
NZDep quintiles			
1 (least deprived)	1		
2	1.07	(1.02–1.12)	0.002
3	1.15	(1.10–1.19)	<0.001
4	1.21	(1.17–1.26)	<0.001
5 (most deprived)	1.27	(1.21–1.32)	<0.001
Highest educational qualification			
None	1.16	(1.10–1.22)	<0.001
Secondary	1.10	(1.04–1.16)	<0.001
Post-secondary	1.15	(1.09–1.20)	<0.001

Table 4 (continued): Fully adjusted model of time to first hospitalisation.

Undergraduate	1.03	(0.98–1.09)	0.27
Postgraduate	1		
Household income			
Loss, 0–20,000	1		
20,001–30,000	1.28	(1.23–1.34)	<0.001
30,001–50,000	1.24	(1.19–1.30)	<0.001
50,001–70,000	1.16	(1.11–1.20)	<0.001
70,001–100,000	1.08	(1.04–1.13)	<0.001
100,001+	1.06	(1.02–1.11)	0.004
Missing	1.16	(1.11–1.21)	<0.001
Self-rated health			
Excellent	1		
Very good	1.14	(1.10–1.18)	<0.001
Good	1.41	(1.36–1.47)	<0.001
Poor	1.80	(1.72–1.88)	<0.001
Very poor	2.45	(2.30–2.61)	<0.001

Note: Hazard ratios are adjusted for all other variables in the table.

on the HR, meaning we can be confident that the result is robust to this failure in the proportional-hazards assumption.

Finally, we modelled the estimated cost savings to the health system of removing prescription cost charges. Data from NZHS 2022/2023, applied to the national population, indicate that about 168,000 adults reported not being able to afford a prescription.[3] If the hospitalisation rates for these people with an unmet need were reduced to the levels of those with no unmet need, 27,000 hospitalisations could be avoided over the median follow-up time of 3 years (1,095 days). Given the cost of one night in hospital is estimated at $1,200,[13] and with an average of three nights in one stay, we conservatively estimate that $32.4 million in hospitalisation costs could potentially be saved each year.

Discussion

We have demonstrated higher rates of hospitalisations among people who have previously faced an inability to afford a prescription. This effect was independent of the socio-demographic variables that we measured, and only partly explained by the confounding effect of underlying health status, as measured using self-reported health.

A small randomised controlled trial of the provision of free prescriptions in Aotearoa found similar results to ours; participants who were provided with free medications had a lower rate of hospitalisations (all cause, and for selected conditions), although the primary outcomes of hospital length of stay did not meet conventional levels of statistical significance.[14] This experimental design—albeit on a relatively small sample—coupled with benefits seen in an international

trial[15] and the larger observational data that we present strongly support not re-introducing prescription charges in Aotearoa.

Differential access to healthcare is a key contributor to ethnic inequities in health,[16] which significantly impacts Māori.[17] Analyses of the implementation of the 2001 Primary Health Care Strategy (PHCS)[18] demonstrated that the Strategy is not compliant with the articles of Te Tiriti o Waitangi.[19,20] Re-introduction of prescription charges would have significant impact for Māori, who experience a significant inequity in this indicator of accessing care.[3]

The most significant limitation of our study is the potential for residual confounding by unmeasured or poorly measured confounding variables. In particular, although we included three measures of socio-economic hardship (area-level deprivation, household income and education levels), each of these may be measured with some degree of imprecision and are unlikely to capture all dimensions of individual level socio-economic position. People with lower incomes are more likely to face a cost barrier to obtaining a prescription, and are more likely to be hospitalised for reasons unrelated to this barrier, due to high levels of, for example, smoking and other social determinants of health. Thus, we suggest that the results should be interpreted with a degree of caution.

A further possible limitation of the analysis is the possibility of selection bias arising from the exclusion of those people who could not be matched in the IDI and those who requested their responses not be linked. Approximately 8% of the sample could not be matched and this is more likely to be due to unmatched address information rather than from the other matching variables, i.e., age, sex. Previous research has shown that around 5.5% of the population experiences transience—defined as relocating more than three times within a 3-year period—with 4.3% classified as vulnerable transients, i.e., having had at least one housing incident in a socio-economically deprived area.[21] It seems plausible that the unmatched subset may exhibit a higher likelihood of relocation, including multiple relocations, indicating higher levels of socio-economic deprivation that would put pressure on accessing continuous healthcare and affording prescription medicines. Consequently, the identified differences in hazard rates comparing people with an unmet need and no unmet need in this study are likely to be conservative.

The prevalence of facing a cost barrier to collecting a prescription was lower in the years 2020/2021 (3.1%) to 2022/2023 (4.0%) than previous years (2019/2020, 5%), meaning that our results are based on a higher prevalence of facing this barrier than is currently reported.[3] It is likely that disruptors to the health system due to the COVID-19 pandemic could explain this, e.g., the lower rate of primary healthcare consultations during the lockdowns is likely to have resulted in lower rates of prescribing. It is also not clear whether our results still apply to the smaller proportion of the population that reports facing these barriers, as compared to the higher proportion in our study years. To err on the side of caution, we used the prevalence of unmet need as reported in 2022/2023 in the calculation of potential cost savings.

We did not include a formal economic evaluation as part of the work that we report. However, we estimated significant savings to the health system due to potentially avoided hospitalisations, were prescriptions to be fully funded. This calculation is based on the assumption of causality, which may not be the case. However, the concurrence of our results with those from experimental[14,15] and other observational studies of different designs[22,23] reinforces the likelihood of there being a causal link between lack of access to medication and increased hospitalisations.

Improving access to primary healthcare was a key aim of the PHCS.[18] Many of the measures that were implemented as part of the Strategy related to access to seeing a general practitioner or other member of the primary healthcare team; funding to remove prescription co-payments was not addressed in the Strategy. There are significant health reforms currently underway in Aotearoa, and many community pharmacists are working in expanded roles, such as provision of some medications without a prescription.[24] These moves increase access to the wider primary healthcare team and may be reflected in reduced cost barriers to primary healthcare in the future, although they do not directly address prescription co-payments.

Since prescriptions require a prior GP visit, our results need to be interpreted in the context of co-payments, which are payable to see a GP in Aotearoa, and represent another important cost barrier to UHC.[6] For example, a GP consultation at a Very Low Cost Access practice is currently $19.50, equivalent in cost to a four-item prescription ($20). A further facet of cost barriers to obtaining a prescription is how frequently this occurs, and

how people behave in the face of a barrier. We were not able to analyse the former as the NZHS only asks about the presence or absence of a cost barrier in the previous 12 months. Qualitative work has explored the impacts of these barriers on individuals and their families. Being unable to afford all items on a prescription means that people make decisions regarding which treatments to prioritise, cut back on doses to make a prescription last longer or go without food in order to pay for prescriptions.[25]

Some large pharmacy chains began covering the cost of co-payments for those items that they dispensed prior to the July 2023 removal of all co-payments and are likely to continue this practice if prescription charges are re-introduced. However, there remain problems with this move; these large chains are generally in urban centres and do not allow access for people who may already be struggling with access to care, for example through living rurally. Furthermore, they may not offer the range of extended services that many community pharmacies are offering, thus reducing access to pharmacist-led care. It has been suggested that the presence of these chains could result in the closure of some independent community pharmacies,[26] further reducing access to care for some people, and potentially increasing health inequities.

A review of 24 European countries regarding the use of user co-payments for healthcare recommended that an annual cap on co-payments be used.[4] Such a cap was applied at the family level in Aotearoa for prescription co-payments prior to their removal in July 2023. This applied to an individual, their partner and dependent children aged 14–18 years (as no charges were payable for younger children). However, this policy can fail when different family members, or the same member on different occasions, obtain(s) their prescriptions from different pharmacists. In addition, the $100 household cap was not widely known about,[25] meaning that not everyone benefitted from this in the absence of improved systems. Improved IT systems across pharmacies in Aotearoa could improve access to the annual household cap on payments, were this to be re-introduced.

In summary, our analysis provides evidence of the potential risks of reinstating prescription charges in Aotearoa, as this may have detrimental effects on health, health equity and health system costs. The revenue to the health system from co-payments may be offset by the costs associated with avoidable hospitalisations. Given the current health reforms in Aotearoa, with the increased focus on community health, accessing primary healthcare and addressing inequities, now is the time for the zero fees policy to be retained.

COMPETING INTERESTS
Nil.

ACKNOWLEDGEMENTS
We thank the respondents of the New Zealand Health Survey, 2013/2014–2018/2019 for their participation in the surveys.
The work was funded by the Health Research Council of New Zealand, grant 18/667.

STATEMENT BY STATISTICS NEW ZEALAND
Access to the data used in this study was provided by Stats NZ under conditions designed to give effect to the security and confidentiality provisions of the *Statistics Act 1975*. The results presented in this study are the work of the author, not Stats NZ or individual data suppliers. These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI), which is carefully managed by Stats NZ. For more information about the IDI please visit https://www.stats.govt.nz/integrated-data/.

AUTHOR INFORMATION
Mona Jeffreys: Associate Professor (Research) – Epidemiology, Te Hikuwai Rangahau Hauora | Health Services Research Centre, Te Herenga Waka – Victoria University of Wellington.
Megan Pledger: Adjunct Research Fellow, Te Wāhanga Tātai Hauora | Faculty of Health, Te Herenga Waka – Victoria University of Wellington.
Fiona McKenzie: Senior Research Fellow, Te Hikuwai Rangahau Hauora | Health Services Research Centre, Te Herenga Waka – Victoria University of Wellington.
Lis Ellison-Loschmann: Co-director, Flax Analytics Ltd, Wellington.
Maite Irurzun Lopez: Consultant Advisor, Te Hikuwai Rangahau Hauora | Health Services Research Centre, Te Herenga Waka – Victoria University of Wellington.
Jacqueline Cumming: Consultant Advisor, Te Hikuwai Rangahau Hauora | Health Services Research Centre, Te Herenga Waka – Victoria University of Wellington.

CORRESPONDING AUTHOR
Mona Jeffreys: Associate Professor (Research) – Epidemiology, Te Hikuwai Rangahau Hauora | Health Services Research Centre, Te Herenga Waka – Victoria University of Wellington. E: mona.jeffreys@vuw.ac.nz

URL
https://nzmj.org.nz/journal/vol-137-no-1595/consequences-of-cost-barriers-to-prescriptions-cohort-study-in-aotearoa-new-zealand

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